

इंटरनेट

मानक

Disclosure to Promote the Right To Information

Whereas the Parliament of India has set out to provide a practical regime of right to information for citizens to secure access to information under the control of public authorities, in order to promote transparency and accountability in the working of every public authority, and whereas the attached publication of the Bureau of Indian Standards is of particular interest to the public, particularly disadvantaged communities and those engaged in the pursuit of education and knowledge, the attached public safety standard is made available to promote the timely dissemination of this information in an accurate manner to the public.

“जानने का अधिकार, जीने का अधिकार”

Mazdoor Kisan Shakti Sangathan

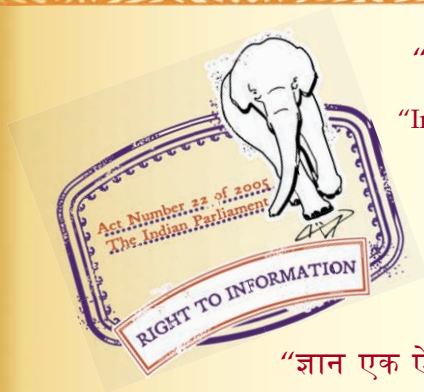
“The Right to Information, The Right to Live”

“पुराने को छोड़ नये के तरफ”

Jawaharlal Nehru

“Step Out From the Old to the New”

IS 12970-5-3 (1992): Semiconductor Devices - Integrated Circuits, Part 5: Analogue Integrated Circuits - Essential Ratings and Characteristics, Section 3: Audio Amplifiers, Video Amplifiers and Multichannel Amplifiers for Telecommunications [LITD 5: Semiconductor and Other Electronic Components and Devices]



“ज्ञान से एक नये भारत का निर्माण”

Satyanarayan Gangaram Pitroda

“Invent a New India Using Knowledge”



“ज्ञान एक ऐसा खजाना है जो कभी चुराया नहीं जा सकता है”

Bhartrhari—Nitiśatakam

“Knowledge is such a treasure which cannot be stolen”

BLANK PAGE



भारतीय मानक

अर्धचालक युक्तियाँ — समाकलित परिपथ

भाग 5 एनालोग समाकलित परिपथ — आवश्यक रेटिंग और गुणधर्म
अनुभाग 3 दूरसंचार के लिये श्रव्य परिवर्धक, दृश्य परिवर्धक और बहुभुंखला एम्पलीफायर

Indian Standard

SEMICONDUCTOR DEVICES — INTEGRATED CIRCUITS

**PART 5 ANALOGUE INTEGRATED CIRCUITS — ESSENTIAL
RATINGS AND CHARACTERISTICS**

**Section 3 Audio Amplifiers, Video Amplifiers and Multichannel Amplifiers for
Telecommunications**

UDC 621.3.048.77.037.33 : 621.375.4.029.4 : 621.39

© BIS 1992

BUREAU OF INDIAN STANDARDS
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

FOREWORD

This Indian Standard (Part 5/Sec 3) was adopted by the Bureau of Indian Standards, after the draft finalized by the Semiconductor Devices and Integrated Circuits Sectional Committee had been approved by the Electronics and Telecommunication Division Council.

This standard is one of the series of standards on Integrated circuits. Other sections of this part are:

Section 1 General

Section 2 Operational amplifier

Section 4 R.F. and I.F. amplifiers

Section 5 Voltage and current regulator

Section 6 Analogue switching circuits

The standard is based on IEC Pub 748-3 'Semiconductor devices integrated circuits : Part 3 Analogue integrate circuits', issued by the International Electrochemical Commission (IEC).

It is proposed to withdraw the existing Indian Standard, namely, IS 7440 (Part 2) : 1974 ' Essential ratings and characteristics of analogue integrated circuits: Part 2 Telecommunication amplifiers (audio, video and multichannel) ', dealing with essential ratings and characteristics of analogue integrated circuits covering Telecommunication amplifiers (audio, video and multichannel) as soon as the clauses therein are covered in the new series [IS 12970 (Part 5)].

In reporting the results of test or analysis made in accordance with this standard, if the final value, observed or calculated is to be rounded off, it shall be done in accordance with IS 2 : 1960 'Rules for rounding off numerical values (*revised*)'.

*Indian Standard***SEMICONDUCTOR DEVICES —
INTEGRATED CIRCUITS****PART 5 ANALOGUE INTEGRATED CIRCUITS — ESSENTIAL
RATINGS AND CHARACTERISTICS****Section 3 Audio Amplifiers, Video Amplifiers and Multichannel Amplifiers for
Telecommunications****1 SCOPE**

This standard (Part 5/Sec 3) covers the essential ratings and characteristics of audio amplifiers, video amplifiers and multichannel amplifiers for telecommunications.

2 REFERENCES

The following Indian Standards are necessary adjuncts to this standard:

<i>IS No.</i>	<i>Title</i>
1885 (Part 7/Sec 5) : 1971	Electrotechnical vocabulary: Part 7 Semiconductor devices, Section 5 Integrated circuits and micro-electronics
3715 (Part 1) : 1971	Letter symbols for semiconductor devices: Part 1 General aspects (<i>first revision</i>)
5000 Series	Dimensions of semiconductor devices
12970 (Part 1) : 1990	Semiconductor devices—Integrated circuits: Part 1 General

3 TERMINOLOGY

For the purpose of this standard term and definitions given in IS 1885 (Part 7/Sec 5) : 1971, provisions of 3 of IS 12970 (Part 1) : 1990 shall be applicable.

4 LETTER SYMBOLS

For the purpose of this standard, letter symbols in IS 3715 (Part 1) : 1971 shall be applicable.

5 FUNCTION

Amplifiers intended for functions in audio, video and telecommunication equipment.

NOTE — The following provisions apply to the three categories of amplifiers, unless otherwise stated.

6 DESCRIPTION OF CIRCUIT**6.1 Technology**

The technology used in the manufacture should be stated, for example, semiconductor monolithic integrated circuit, thin film integrated circuit, hybrid integrated circuit, micro-assembly, etc.

6.2 Details of Outline and Encapsulation

6.2.1 Where applicable reference to standard outlines and bases (*see* IS 5000 Series) or outlines and base drawing showing dimension and tolerances shall be given.

6.2.2 Method of Encapsulation**6.2.3 Marking**

The drawing of the package outline with the marking should be indicated.

6.3 Block-Diagram and Terminal Connections

The block-diagram and the identification of the connections should be shown on the same drawing. If the encapsulation has metallic parts, any connection to them from external terminals should be indicated. The connections with any associated external electrical elements should be stated (*see also* 9).

As additional information, the complete electrical diagram can be reproduced, including significant parasitic elements, but not necessarily with indications of the value of the circuit components.

7 RATINGS (LIMITING VALUES)

7.0 The ratings given must cover the operation of the integrated circuit cover the specified range of operating temperatures. Where such ratings are temperature-dependent, this dependence should be indicated. If externally connected elements have an influence on the ratings, the ratings should be given for the amplifier with the elements connected.

7.1 Electrical Limiting Values

7.1.1 Power Supply Voltage(s)

- Maximum value(s) and polarity(ies), and
- Maximum value of the voltage between a common supply terminal and case or reference terminal, where appropriate.

NOTE — The sequence of the application of supply voltage should be given, where appropriate.

7.1.2 Input Terminal Voltage(s) and/or Current(s)

Maximum values.

7.1.3 Output Terminal Voltage(s) and/or Current(s)

Maximum values.

7.2 Temperatures

7.2.1 Operating Temperatures

Minimum and maximum values or reference-point operating temperature.

7.2.2 Storage Temperatures

Minimum and maximum values.

7.3 Power Dissipation (Where Appropriate)

Maximum value over the operating temperature range.

8 RECOMMENDED OPERATING CONDITIONS (WITHIN THE SPECIFIED OPERATING TEMPERATURE RANGE)

8.0 For 8.1 to 8.4 the variation with temperature should be stated, where appropriate.

8.1 Power Supplies

Polarities, values and tolerances for voltages and/or currents.

8.2 Input Terminals

8.2.1 Value(s) of the voltage(s) and/or current(s) of the input signal or of the impedance of the signal source.

8.2.2 Value(s) of the bias on the input terminals, where appropriate.

8.3 Output Terminals

8.3.1 Nominal value(s) of the voltage(s) and/or current(s) of the output signal and of the load impedance.

8.3.2 Value(s) of the bias on the output terminals, where appropriate.

8.4 External Elements

Values and tolerances for the external elements that must be associated with the circuit.

9 ELECTRICAL CHARACTERISTICS

9.0 Electrical characteristics should be stated as follows:

- If external elements are essential for the operation of the circuit, the electrical characteristics should include the effect of such external elements.
- If external elements are optional only, the electrical characteristics should be given for the integrated circuit alone. The effect of adding specified external elements on the characteristics should then be indicated in application data.

9.1 Characteristics at 25°C (Ambient or Reference-Point Temperature)

9.1.1 Power (or Supply Current) Consumption (P_{tot})

Typical maximum value under specified conditions.

9.1.2 Input Characteristics

9.1.2.1 Input impedance or admittance

In the case of high (low) impedance; typical and minimum (maximum) values of input impedance, or: typical and maximum (minimum) values of input admittance as function of frequency in the specified frequency range and under specified conditions.

In the case of impedance matching; the minimum return loss for the specified resistance in the specified frequency range and under specified conditions.

NOTE — Return loss,
(in dB) = $20 \log_{10} [(Z + R) / (Z - R)]$.

where Z is the impedance and R the specified resistance.

To characterize the input characteristics, scattering parameters may be used, where appropriate.

9.1.2.2 Input bias current (where appropriate) (I_{IB})

Typical and maximum values under specified conditions.

9.1.2.3 Supply voltage rejection ratio (where appropriate) ($PSRR$)

Maximum value over the operating temperature range.

9.1.2.4 Offset voltage and/or current (where appropriate) (V_{10} I_{10})

Maximum value.

9.1.2.5 Mean temperature coefficient of offset voltage or current (where appropriate) (α_{V10} , α_{I10})

Maximum value over the operating temperature range.

9.1.3 Output Characteristics

9.1.3.1 Output impedance or admittance

In the case of low (high) impedance; typical and maximum (minimum) values of output impedance, or typical and minimum (maximum) values of output admittance as function of frequency in the specified frequency range and under specified conditions.

In the case of impedance matching, the minimum return loss for a specified resistance in the specified frequency range and under specified conditions.

9.1.3.2 Maximum signal output

Minimum value of the output signal current, voltage or power for specified values of:

- a) distortion,
- b) load impedance,
- c) signal frequency,
- d) supply voltage(s), and
- e) adjustment of gain control (if it exists).

Minimum overload point, under the same specified conditions, for multichannel amplifiers.

9.1.4 Forward Transfer Characteristics

9.1.4.1 Voltage gain, or current gain, or forward transadmittance, or power gain, for specified values of:

- a) supply voltage(s),
- b) frequency,
- c) load and source impedance(s),
- d) adjustment of gain control (if it exists), and
- e) amplitude of the output signal at which the gain is measured.

The parameter should be measured at an input signal lower than the AGC threshold. Minimum and typical values should be specified.

9.1.4.2 Cut-off frequency, 3 dB point (for audio and video amplifiers only) (f_c)

Maximum value of low frequency, 3 dB point, and minimum value of high frequency, 3 dB point. For amplifiers transmitting the dc component, high cut-off frequency only.

9.1.4.3 Gain and phase (and/or group-delay) versus frequency under specified conditions:

a) Gain

Minimum and maximum values of voltage amplification and/or current amplification and/or power gain versus frequency, under specified conditions, as shown in Fig. 1.

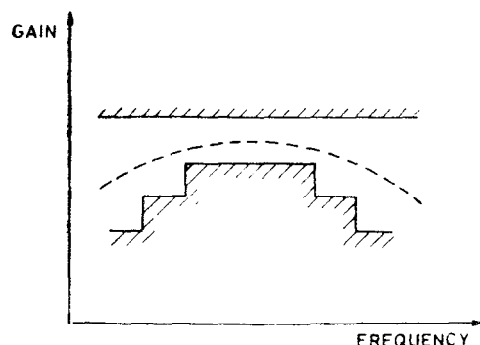


FIG. 1 MINIMUM AND MAXIMUM VALUES FOR GAIN VERSUS FREQUENCY

b) Phase

Where appropriate, minimum and maximum phase and/or group delay (envelop-delay) under the conditions specified for gain versus frequency, as shown in Fig 2.

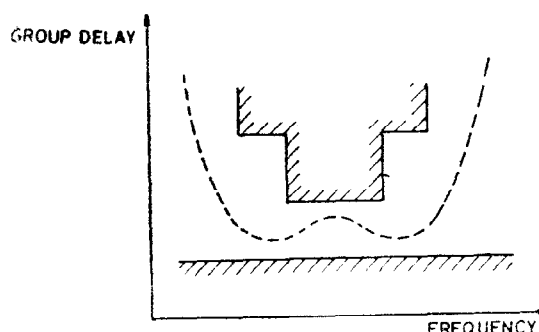


FIG. 2 MINIMUM AND MAXIMUM VALUES FOR GROUP-DELAY VERSUS FREQUENCY

9.1.5 Reverse Transfer Characteristics

Under considerations for multichannel amplifiers.

9.1.6 Interaction Between the Amplifiers and the Supply Lines

For multichannel amplifiers and, where appropriate, for video amplifiers.

Under consideration.

9.1.7 Noise (Where Appropriate)

Maximum value.

The noise should be specified in terms of noise factor or in terms of equivalent input voltage and/or current, for specified values of supply voltage(s), source resistance, frequency and bandwidth.

9.1.8 Distortion

Distortion under specified conditions, especially; load impedance, output signal level, fundamental and component frequency, supply voltage(s) and adjustment of gain control (if it exists).

- a) Maximum total harmonic distortion (for audio amplifiers only);
- b) Maximum harmonic distortion for the second and where appropriate, for the third harmonic;
- c) Maximum intermodulation for the second and, where appropriate, for the third and higher order products (for video and multichannel amplifiers only); and
- d) Differential phase (error) and differential gain (error) (video amplifiers only).

Maximum and/or typical values of differential phase (error) and differential gain (error) for specified values of:

- a) frequencies and levels of both low-frequency signal and superimposed high-frequency signal, and
- b) Load impedance.

9.1.9 Pulse Characteristics (Where Appropriate)

Under consideration.

9.2 Effects of Variation of Temperature and Supply Voltages on the Essential Characteristics (see 9.1)

The changes in the following characteristics with temperature and supply voltages should be stated.

This information should be given either for the typical value of the characteristic or for the limit (maximum or minimum) value of the characteristic.

This information should normally be given as application data for the device, and not as acceptance criteria for acceptance against a specification. The data called for in 9.2.1 should be given at a specified value of supply voltage(s) and the data required in 9.2.2 should be given at a temperature of 25°C.

9.2.1 Variation with Temperature

- a) Power (or supply current) consumption (see 9.1.1);
- b) Input impedance or admittance (see 9.1.2.1); Magnitude and, where appropriate, real and/or imaginary part;
- c) Input bias current, when specified (see 9.1.2.2);
- d) Offset voltage and/or current, when specified (see 9.1.2.4);
- e) Output impedance or admittance (see 9.1.3.1); Magnitude and, where appropriate, real and or imaginary part (not applicable for audio amplifiers);
- f) Gain (see 9.1.4.1); and
- g) Distortion (see 9.1.8).

Where appropriate, total harmonic distortion (for audio and video amplifiers) and maximum intermodulation (for multi-channel amplifiers).

9.2.2 Variation with Supply Voltages

- a) Power (or supply current) consumption (see 9.1.1),
- b) Maximum signal output (see 9.1.3.2),
- c) Gain (see 9.1.4.1), and
- d) Distortion (see 9.1.8).

Where appropriate, total harmonic distortion (for audio and video amplifiers) and maximum intermodulation (for multi-channel amplifiers).

10 MECHANICAL CHARACTERISTICS AND OTHER DATA

Provisions of 5.5 of IS 12970 (Part 1) : 1990 shall apply.

11 APPLICATION DATA

11.1 Information concerning the variations of the characteristics given in 9.1 with supply voltage, temperature, source and load impedance may be given.

11.2 Any other pertinent information concerning particular applications may be given, for example, optimum resistance of the generator for a minimum noise factor.

Standard Mark

The use of the Standard Mark is governed by the provisions of the *Bureau of Indian Standards Act, 1986* and the Rules and Regulations made thereunder. The Standard Mark on products covered by an Indian Standard conveys the assurance that they have been produced to comply with the requirements of that standard under a well defined system of inspection, testing and quality control which is devised and supervised by BIS and operated by the producer. Standard marked products are also continuously checked by BIS for conformity to that standard as a further safeguard. Details of conditions under which a licence for the use of the Standard Mark may be granted to manufacturers or producers may be obtained from the Bureau of Indian Standards.

Bureau of Indian Standards

BIS is a statutory institution established under the *Bureau of Indian Standards Act, 1986* to promote harmonious development of the activities of standardization, marking and quality certification of goods and attending to connected matters in the country.

Copyright

BIS has the copyright of all its publications. No part of these publications may be reproduced in any form without the prior permission in writing of BIS. This does not preclude the free use, in the course of implementing the standard, of necessary details, such as symbols and sizes, type or grade designations. Enquiries relating to copyright be addressed to the Director (Publications), BIS.

Review of Indian Standards

Amendments are issued to standards as the need arises on the basis of comments. Standrds are also reviewed periodically; a standard along with amendments is reaffirmed when such review indicates that no changes are needed; if the review indicates that changes are needed, it is taken up for revision. Users of Indian Standards should ascertain that they are in possession of the latest amendments or edition by referring to the latest issue of 'BIS Handbook' and 'Standards Monthly Additions'. Comments on this Indian Standard may be sent to BIS giving the following reference:

Doc : No. LTD 010 (1231)

Amendments Issued Since Publication

Amend No.	Date of Issue	Text Affected

BUREAU OF INDIAN STANDARDS

Headquarters:

Manak Bhavan, 9 Bahadur Shah Zafar Marg, New Delhi 110002
Telephones : 331 01 31, 331 13 75

Telegrams : Manaksanstha
(Common to all offices)

Regional Offices :

Telephone

Central ; Manak Bhavan, 9 Bahadur Shah Zafar Marg NEW DELHI 110002	{ 331 01 31 331 13 75
Eastern ; 1/14 C. I. T. Scheme VII M, V. I. P. Road, Maniktola CALCUTTA 700054	{ 37 84 99, 37 85 61 37 86 26, 37 86 62
Northern ; SCO 445-446, Sector 35-C, CHANDIGARH 160036	{ 53-38 43, 53 16 40 53 23 84
Southern ; C. I. T. Campus, IV Cross Road, MADRAS 600113	{ 235 02 16, 235 04 42 235 15 19, 235 23 15
Western ; Manakalaya, E9 MIDC, Marol, Andheri (East) BOMBAY 400093	{ 632 92 95, 632 78 58 632 78 91, 632 78 92

Branches : AHMADABAD. BANGALORE. BHOPAL. BHUBANESHWAR.
COIMBATORE. FARIDABAD. GHAZIABAD. GUWAHATI. HYDERABAD.
JAIPUR. KANPUR. LUCKNOW. PATNA. THIRUVANANTHAPURAM.